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(54) IR space heating luminaire.

(57) The IR space heating luminaire has an elongate concave reflector (1) in which a tubular incandescent lamp (2) is accommodated. The reflector has a dark anodized aluminium reflecting surface (3). A screen (5), which may have a similar reflecting surface (6), is present between the lamp and the radiation emission window (4) of the luminaire. The screen (5) intercepts light rays which would otherwise leave the luminaire. The reflector (1) reduces the light output of the luminaire, thereby minimizing a disadvantage of saleable luminaires.

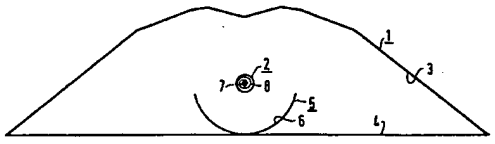

FIG.1

EP 0 577 196 A1

The invention relates to an IR space heating luminaire comprising an elongate concave reflector in which a tubular electric incandescent lamp is accommodated and which comprises a reflecting surface facing the lamp and a radiation emission window for the radiation generated by the lamp.

Such an IR space heating luminaire is known from DE 1 009 733.

A disadvantage of the known luminaire is that it radiates comparatively much light. Even though the electric lamp has a low luminous efficacy, for example 5 lm/W, the luminous flux generated is still too great because an IR lamp usually consumes a power of a few hundred W to a few kW. An IR lamp of 1 kW thus has a luminous flux similar to that of a GLS lamp of 375 W. An unpleasantly high illuminance is achieved during heating of public buildings such as, for example churches, spectator stands, café pavements, or for example stables.

To counteract this disadvantage, electric lamps are sometimes used which are surrounded by a tube of red glass, for example, red quartz glass. Not only is this solution expensive, but it is also unacceptable in some situations because of the red light in the emitted radiation.

It is known from CN 10 759 to give the incandescent body of an IR lamp a comparatively low temperature, so that the lamp has a low luminous efficacy. A disadvantage of this lamp, however, is that it is expensive because the incandescent body contains much tungsten.

It is an object of the invention to provide an IR space heating luminaire of the kind described in the opening paragraph which emits radiation with a smaller proportion of visible radiation.

This object is achieved in an IR space heating luminaire of the kind described in the opening paragraph in that the reflecting surface is made of dark anodized aluminium and in that a screen is present which intercepts unreflected light.

Dark anodized aluminium has a comparatively high reflection coefficient in the IR range of the spectrum and a comparatively low reflection coefficient in the visible range of the spectrum. The result of this is that the light share in the reflected radiation is considerably less than the light share in the radiation generated by the lamp. It is useful for this reason that the screen intercepts light which would issue to the exterior from the reflector if the screen were absent.

Dark anodized aluminium has been known for more than thirty years from GB 850 576 and GB 962 048. The aluminium may have a colour which varies, for example, from jet-black, bluish black, brownish black, greyish black to black, and it may comprise in addition to trace elements some tenths of percents by weight up to a few percents by weight of elements chosen from, for example, Cu, Mg, Zn, Cr, Si, Fe, Mn, Zn, and Ti.

The screen may be of various kinds and may, for example, throw the radiation incident thereon, light and IR radiation, towards the reflector. Alternatively, the screen may have a surface facing the lamp which is also made of dark anodized aluminium. This has the advantage that the light incident thereon is mainly absorbed and that of the reflected light only that fraction which is not absorbed by the reflector can leave the luminaire.

It is favourable when the screen has a concave surface facing the lamp, for example, such a surface having an axis of curvature coinciding with the lamp. IR radiation reflected by the screen can then follow a path, after reflection by the reflector, which is also followed by IR radiation thrown directly by the lamp onto the reflector.

The electric lamp in a favourable embodiment is a halogen IR lamp. Blackening of the lamp vessel by the deposition of tungsten from the incandescent body is avoided in that case. Blackening could give the lamp temperature an undesirable high value. Light of low intensity issues from the luminaire, the reflector has a low brightness, and the light has a comparatively low colour temperature and is similar to candle light.

To prevent a disturbance of the IR radiation pattern formed by the reflector, it is favourable when the luminaire is open, not closed in the radiation emission window with, for example, a glass plate.

An embodiment of the IR space heating luminaire according to the invention is shown in the drawings, in which

Fig. 1 is a cross-section of the luminaire; and

Fig. 2 shows the reflection spectrum of the reflector of the luminaire according to Fig. 1.

In Fig. 1,the IR space heating luminaire has an elongate concave reflector 1 in which a tubular electric incandescent lamp 2 is arranged. The reflector has a reflecting surface 3 facing the lamp and an emission window 4 for the radiation generated by the lamp. A screen 5 is present, intercepting unreflected light. The reflecting surface 3 is of dark anodized aluminium.

The screen 5 in the Figure also has a surface 6 of dark anodized aluminium facing the lamp. The surface is concave and has an axis of curvature coinciding with the lamp in the Figure.

The emission window 4 is open.

The incandescent lamp has an incandescent body 7 which is held in a central position in the lamp by supports 8.

In Fig. 2, the reflection spectrum represented by a fully drawn line is that of the reflector and of the screen of Fig. 1, each made of dark anodized aluminium comprising in addition in a few μm thick surface layer approximately 1% Cr by weight, 1%

Ni by weight and 15% S by weight. The aluminium is a dark grey, colour point coordinates: x = .305, y = .313 under a daylight lamp D65 according to CIE. It gives a reflection of 4.4% under this lamp. The transmission spectrum of red quartz glass is indicated with a broken line for comparison.

It is apparent from the Figure that the reflector and the screen have a reflectance in the IR range which is not inferior to the IR transmittance of red quartz glass. It is also apparent that the reflector has a steeper flank at a higher wavelength and is better positioned at the transition from the visible spectrum to the IR spectrum, at 720 nm, than is red quartz glass. As a result, the reflector reflects less red light than is transmitted by red quartz glass. The transmission of red quartz glass below approximately 450 nm is approximately zero, whereas the reflector still reflects approximately 5% then. The result is that the IR space heating luminaire according to the invention, while avoiding the use of expensive red quartz glass, generates IR radiation with the pleasant colour of candle light (colour temperature T_c = 1966; colour point coordinates: x = .550; y = .439).

Claims

1. An IR space heating luminaire comprising an elongate concave reflector (1) in which a tubular electric incandescent lamp (2) is accommodated and which comprises a reflecting surface (3) facing the lamp and a radiation emission window (4) for the radiation generated by the lamp, characterized in that the reflecting surface (3) is made of dark anodized aluminium and in that a screen (5) is present which intercepts unreflected light.

2. An IR space heating luminaire as claimed in Claim 1, characterized in that the screen (5) has a surface (6) of dark anodized aluminium facing the lamp (2).

3. An IR space heating luminaire as claimed in Claim 2, characterized in that the surface (6) is concave.

4. An IR space heating luminaire as claimed in Claim 3, characterized in that the surface (6) has an axis of curvature which coincides with the lamp (2).

5. An IR space heating luminaire as claimed in Claim 1 or 2, characterized in that the emission window (4) is open.

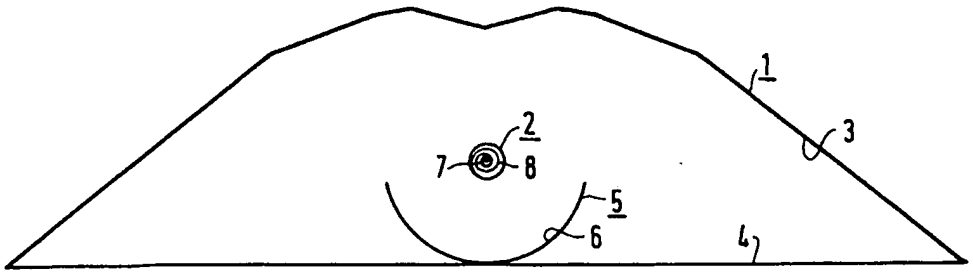

FIG.1

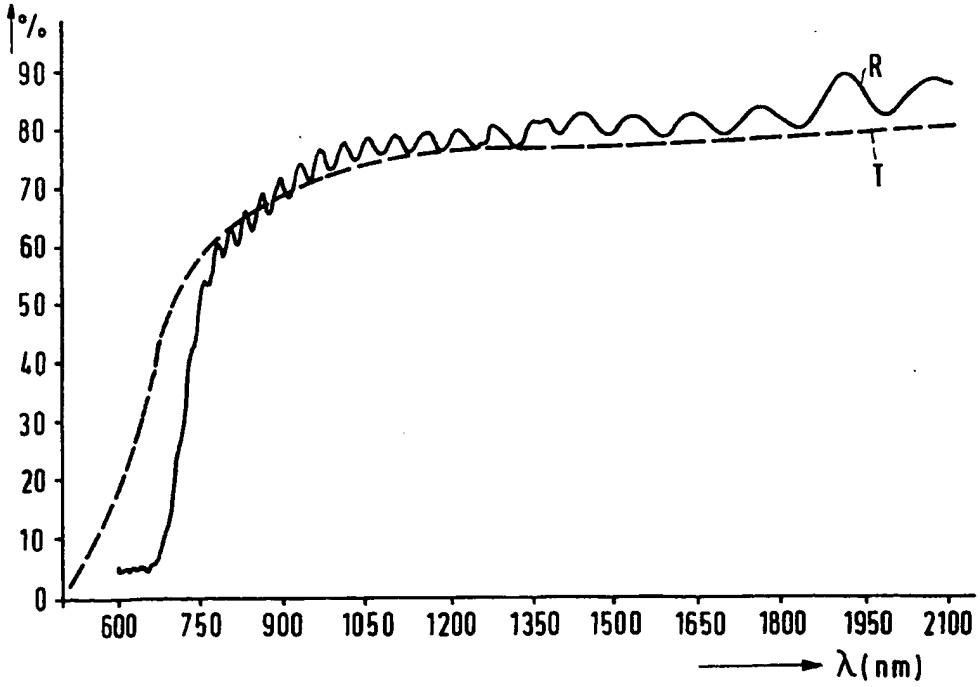

FIG.2

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EUROPEAN SEARCH REPORT

Application Number
EP 93 20 1822

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
Y	EP-A-0 416 868 (GRACE) * column 3, line 44 - line 50; claim 1; figure 1 *	1-3	F24C7/06
Y	US-A-3 179 789 (GIALANELLA) * the whole document *	1-3	
A	FR-A-761 383 (POELVOORDE) * page 2, line 43 - line 50; figures *	1	
A	DE-C-820 732 (SIEMENS)		
			TECHNICAL FIELDS SEARCHED (Int.Cl.5) F24C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	28 September 1993	VANHEUSDEN, J

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
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E : earlier patent document, but published on, or after the filing date
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